MATERIAL SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Stop 2320
Gaithersburg, Maryland 20899-2320

SRM Number: 4325
MSDS Number: 4325
SRM Name: Beryllium-10/Beryllium-9 Isotopic Ratio Standard

Date of Issue: 02 May 2005

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Description: SRM 4325 contains Beryllium-10/Beryllium-9 chloride in 50-milliliters of solution. The solution is packaged in two 30-milliliter Teflon™ bottles (25 mL each). The solution consists of 5.15 mg of beryllium per gram of 1 N hydrochloric acid. The SRM is intended for the calibration of accelerator mass spectrometers used to measure beryllium isotopic ratios.

Substance: Beryllium-10/Beryllium-9 Chloride in 1 N Hydrochloric Acid

Other Designations: **Beryllium-10/Beryllium-9 Chloride** (beryllium dichloride; glucinium chloride) in 1 N **Hydrochloric Acid** (aqueous hydrochloric acid; hydrogen chloride; muriatic acid).

2. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

Component:	**Hydrochloric Acid**
CAS Number:	7647-01-0
EC Number (EINECS):	231-595-7
SRM Nominal Concentration:	1 N
EC Classification:	T, C
EC Risk (R):	23, 35
EC Safety (S):	1, 2, 9, 26, 36, 37, 39, 45

Component:	**Beryllium Chloride (powder form)**
CAS Number:	7787-47-5
EC Number (EINECS):	232-116-4
SRM Nominal Concentration (mass %):	0.515
EC Classification:	T, Xi, N
EC Risk (R):	23, 25, 26, 36, 37, 38, 43, 48, 49, 51, 53
EC Safety (S):	45, 53, 61

3. HAZARDS IDENTIFICATION

Hydrochloric Acid NFPA Ratings (Scale 0–4):	Health = 3	Fire = 0	Reactivity = 0
Beryllium Chloride NFPA Ratings (Scale 0–4):	Health = 3	Fire = 0	Reactivity = 2

Potential Health Effects

Inhalation: Inhalation of hydrochloric acid fumes may cause irritation and burning of the nose, throat, and upper respiratory tract, coughing and choking.

Skin Contact: Skin contact of hydrochloric acid and beryllium chloride may cause severe irritation. Skin contact of hydrochloric acid may also cause inflammation and chemical burns.

Eye Contact: Hydrochloric acid vapors are irritating and may cause damage to the eyes. Eye contact of hydrochloric acid and beryllium chloride may cause severe irritation, conjunctivitis, burning sensation, and possible corneal damage.

Ingestion: Ingestion of hydrochloric acid can cause pain and burns of the mouth, throat, esophagus, and stomach. May also cause nausea, vomiting, diarrhea, chills, shock, and intense thirst. Perforation of the intestinal tract and circulatory collapse may occur. Death may occur due to esophageal or gastric necrosis. Animal studies of acute ingestion of beryllium chloride indicate that low doses may be fatal.

Major Health Hazards: Hydrochloric Acid: Respiratory tract burns. Skin burns. Eye burns. Mucous membrane burns.

Listed as a Carcinogen/ Possible Carcinogen

Hydrochloric Acid:

Yes	No	
	X	In the National Toxicology Program (NTP) Report on Carcinogens.
	X	In the International Agency for Research on Cancer (IARC) Monographs.
	X	By the Occupational Safety and Health Administration (OSHA).

Beryllium Chloride:

Yes	No	
X		In the National Toxicology Program (NTP) Report on Carcinogens.
X		In the International Agency for Research on Cancer (IARC) Monographs.
	X	By the Occupational Safety and Health Administration (OSHA).

4. FIRST AID MEASURES

Skin Contact: Rinse affected area with copious amounts of water for at least 15 minutes while removing contaminated clothing followed by washing the area with soap and water. Obtain medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance immediately.

Inhalation: If adverse effects occur, remove to uncontaminated area. Give artificial respiration by qualified personnel if not breathing. Get medical attention if necessary.

Ingestion: If ingestion occurs, immediately contact poison control center or physician. **DO NOT INDUCE VOMITING.** Give large quantities of water. Never give anything by mouth to an unconscious person. If vomiting occurs, keep head lower than hips to prevent aspiration. If a person is unconscious, turn head to side. Obtain immediate medical assistance.

5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Hydrochloric acid and beryllium chloride are negligible fire hazards.

Extinguishing Media: Use regular dry chemical, carbon dioxide, water, or regular foam.

Fire Fighting: **DO NOT** touch spilled material. Move container from fire area if it can be done without risk. Use extinguishing agents appropriate for surrounding fire. Avoid inhalation of material or combustion by-products.

Flash Point (°C): Not applicable.
Method Used: Not applicable.

Autoignition Temp. (°C): Not applicable.

Flammability Limits in Air
UPPER (Volume %): Not applicable.
LOWER (Volume %): Not applicable.

6. ACCIDENTAL RELEASE MEASURES

Occupational Release: **DO NOT** touch spilled material. Notify safety personnel of spill. Absorb with sand or other non-combustible material. Collect with absorbent into suitable container for proper disposal

Disposal: Refer to Section 13, "Disposal Considerations".

7. HANDLING AND STORAGE

Storage: Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances. Store in a well-ventilated area.

Safe Handling Precautions: See Section 8, "Exposure Controls and Personal Protection".

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits:

Hydrochloric Acid
OSHA (PEL): 7 mg/m^3 (5 ppm) ceiling
ACGIH (TLV): 2 ppm ceiling
NIOSH: 7 mg/m^3 (5 ppm) recommended ceiling
OES UK: 2 mg/m^3 (1 ppm) TWA (gas, mist)
OES UK: 8 mg/m^3 (5 ppm) STEL (gas, mist)

Beryllium Chloride
OSHA (PEL): 2 µg (Be)/m^3 TWA
OSHA (PEL): 5 µg (Be)/m^3 ceiling
ACGIH (TLV): 0.002 mg (Be)/m^3 TWA
ACGIH (TLV): 0.01 mg (Be)/m^3 STEL
NIOSH: 0.0005 mg (Be)/m^3 (10 h) recommended TWA
UK MEL: 0.002 mg (Be)/m^3 TWA

Ventilation: Use a local exhaust ventilation system. Ensure compliance with applicable exposure limits.

Eye Protection: Wear safety goggles or a face shield. **DO NOT** wear contact lenses in the laboratory. An eye wash station should be readily available near areas of use.

Personal Protection: Wear appropriate protective clothing and disposable chemically resistant gloves to prevent skin exposure.

9. PHYSICAL AND CHEMICAL PROPERTIES

Component: **Hydrochloric Acid**
Appearance and Odor: Colorless, liquid. Pungent odor.
Relative Molecular Weight: 36.46 g/mol
Molecular Formula: HCl
Evaporation Rate (HCl solutions 0.02 N to 2 N): > 1 (ether = 1)
Density (1 N HCl): 1.0 g/cm^3
Water Solubility: Soluble.

Component:	**Beryllium Chloride (powder form)**
Appearance:	Colorless to yellow solid.
Relative Molecular Weight:	79.91 g/mol
Molecular Formula:	$BeCl_2$
Density:	1.899 g/cm^3
Water Solubility:	Soluble.

10. STABILITY AND REACTIVITY

Stability: X Stable ____ Unstable

Stable under ordinary conditions of use and storage.

Conditions to Avoid: Avoid heat, flames, sparks, and other sources of ignition. May ignite or explode on contact with combustible materials. Keep out of water supplies and sewers.

Incompatible Materials: Hydrochloric acid is incompatible with cyanides, metals, amines, bases, metal carbide, oxidizing materials, acids, halo carbons, combustible materials, halogens, and metal salts. Beryllium chloride is incompatible with metals.

Fire/Explosion Information: See Section 5, "Fire Fighting Measures".

Hazardous Decomposition: Thermal decomposition of hydrochloric acid may produce acid halides. Thermal decomposition of beryllium chloride may produce acid halides and oxides of beryllium.

Hazardous Polymerization: ____ Will Occur X Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Entry: X Inhalation X Skin X Ingestion

Toxicity Data
Hydrochloric Acid:
Man, Oral LD_{LO}: 2 857 µg/kg
Woman, Oral LD_{LO}: 420 µl/kg
Human, Inhalation LC_{LO}: 1 300 ppm/30 min
Human, Inhalation LC_{LO}: 3 000 ppm/5 min
Rat, Inhalation LC_{50}: 3 124 ppm/1 h

Toxicity Data
Beryllium Chloride:
Human, Inhalation TC_{LO}: 1 mg/m^3
Rat, Oral LD_{50}: 86 mg/kg
Rat, Intraperitoneal LD_{50}: 5 320 µg/kg

Mutagenic, Tumorigenic, Reproductive Data: Beryllium chloride has been investigated as a tumorigenic, mutagenic, and reproductive effector. Hydrochloric acid has been investigated as a mutagenic and reproductive effector.

Health Effects (Acute and Chronic): See Section 3: "Hazards Identification" for potential health effects.

12. ECOLOGICAL INFORMATION

Ecotoxicity Data
Hydrochloric Acid:
Fish: Fathead minnow (Pimephales promelas) LC_{50} (mortality): 21 900 µg/L (96 h)
Invertebrate: Water flea (Daphnia magna) EC_{50} (immobilization): 560 µg/L (48 h)
Algae: Green algae (Chlorella pyrenoidosa) EC_{50} (population size reduction): 800 µg/L (1 600 weeks)
Phytotoxicity: Water-hyacinth (Eichhornia crassipes) (residue): 1 000 µg/L (4 weeks to 48 weeks)

Beryllium Chloride: Fish: Fathead minnow (Pimephales promelas) LC_{50} (mortality): 150 µg/L (96 h)
Invertebrate: Oligochaete (Lumbriculus variegatus) LC_{50} (mortality): > 10 000 µg/L (96 weeks)
Environmental Summary: Highly toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Dispose in accordance with all applicable federal, state, and local regulations. Hydrochloric acid is subject to disposal regulations U.S. EPA 40 CFR 262, Hazardous Waste Number D002. Beryllium chloride is subject to disposal regulation U.S. EPA 40 CFR 262, Hazardous Waste Number D002.

14. TRANSPORTATION INFORMATION

SRM 4325: Beryllium-10/Beryllium-9 Isotopic Ratio Standard (25 mL × 2).
U.S. DOT and IATA: Corrosive Liquid, Dangerous Goods in Excepted Quantities (25 mL × 2), UN1789, Hazard Class 8.

15. REGULATORY INFORMATION

U.S. Regulations:

CERCLA Sections 102a/103 (40 CFR 302.4):
Hydrochloric Acid: RQ 2272.73 kg (5 000 lbs) (liquid)
Beryllium Chloride: RQ 0.4545 kg (1 lb)

SARA Title III Section 302 (40 CFR 355.30):
Hydrochloric Acid: TPQ 227.27 kg (500 lbs) (gas)

SARA Title III Section 304 (40 CFR 355.40):
Hydrochloric Acid: RQ 2272.73 kg (5 000 lbs) (gas)

SARA Title III Section 313 (40 CFR 372.65):
Hydrochloric Acid: except non-aerosol forms
Beryllium and compounds

OSHA Process Safety (29 CFR 1910.119):
Hydrochloric Acid: TQ 2272.73 kg (5 000 lbs) (gas)

California Proposition 65: Beryllium and beryllium compounds are known to the state of California to cause the following: Cancer (1987).

SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

ACUTE:	Yes.
CHRONIC:	Yes.
FIRE:	No.
REACTIVE:	No.
SUDDEN RELEASE:	No.

CANADIAN Regulations: WHMIS Classification: Not determined.

EUROPEAN Regulations:

EC Classification:

T	Toxic
C	Corrosive
Xi	Irritant
N	Dangerous for the Environment Carcinogen Category 2

EC Risk Phrases:

R 23/48	Toxic: danger of serious damage to health by prolonged exposure through inhalation.
R 25	Toxic if swallowed.
R 26	Very toxic by inhalation.
R 35	Causes severe burns.

EC Risk Phrases continued:

R 36/37/38	Irritating to eyes, respiratory system, and skin.
R 43	May cause sensitization by skin contact.
R 49	May cause cancer by inhalation.
R 51/53	Toxic to aquatic organisms, bay cause long-term adverse effects in the aquatic environment.

EC Safety Phrases:

S1/2	Keep locked up and out of reach of children.
S 9	Keep container in a well-ventilated place.
S 26	In case of contact with eyes rinse immediately with plenty of water and seek medical advice.
S 36/37/39	Wear suitable protective clothing, gloves, and eye/face protection.
S 45	In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 53	Avoid exposure. Obtain special instruction before use.
S 61	Avoid release to the environment.

National Inventory Status

U.S. Inventory (TSCA): Hydrochloric acid and beryllium chloride are listed on inventory.

TSCA 12 (b) Export Notification: Not listed.

16. OTHER INFORMATION

Sources: MDL Information Systems, Inc., MSDS *Hydrochloric Acid* 09 December 2004.
MDL Information Systems, Inc., MSDS *Beryllium Chloride* 16 September 2004.